

FDMS8680

N-Channel PowerTrench® MOSFET

30V, 35A, 7.0mΩ

Features

- Max $r_{DS(on)}$ = 7.0mΩ at $V_{GS} = 10V$, $I_D = 14A$
- Max $r_{DS(on)}$ = 11.0mΩ at $V_{GS} = 4.5V$, $I_D = 11.5A$
- Advanced Package and Silicon combination for low $r_{DS(on)}$ and high efficiency
- MSL1 robust package design
- RoHS Compliant

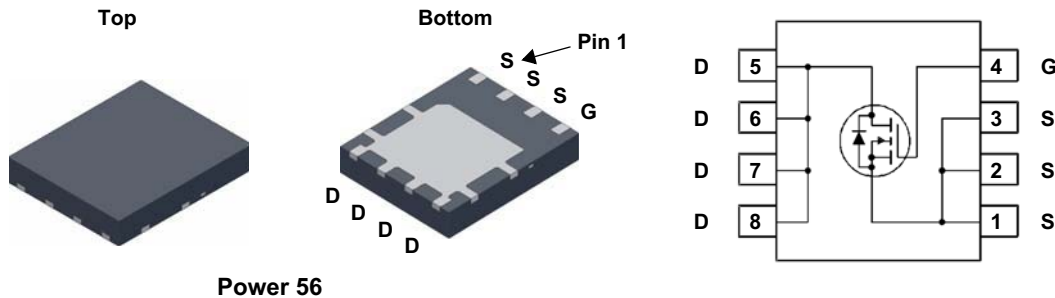


General Description

The FDMS8680 has been designed to minimize losses in power conversion application. Advancements in both silicon and package technologies have been combined to offer the lowest $r_{DS(on)}$ while maintaining excellent switching performance.

Applications

- Low Side for Synchronous Buck to Power Core Processor
- Secondary Side Synchronous Rectifier
- Low Side Switch in POL DC/DC Converter
- Oring FET/ Load Switch



Power 56

MOSFET Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current -Continuous (Package limited) $T_C = 25^\circ C$	35	A
	-Continuous (Silicon limited) $T_C = 25^\circ C$	63	
	-Continuous $T_A = 25^\circ C$ (Note 1a)	14	
	-Pulsed	100	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	216	mJ
P_D	Power Dissipation $T_C = 25^\circ C$	50	W
	Power Dissipation $T_A = 25^\circ C$ (Note 1a)	2.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.5	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS8680	FDMS8680	Power 56	13"	12mm	3000units

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		24		$\text{mV}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			± 100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	1.0	1.8	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		-5.7		$\text{mV}/^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 14\text{A}$		5.5	7.0	m Ω
		$V_{GS} = 4.5\text{V}, I_D = 11.5\text{A}$		8.5	11.0	
		$V_{GS} = 10\text{V}, I_D = 14\text{A}, T_J = 125^\circ\text{C}$		8.2	10.5	
g_{FS}	Forward Transconductance	$V_{DD} = 10\text{V}, I_D = 14\text{A}$		72		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$		1195	1590	pF
C_{oss}	Output Capacitance			555	740	pF
C_{rss}	Reverse Transfer Capacitance			95	145	pF
R_g	Gate Resistance	$f = 1\text{MHz}$		0.8	4.0	Ω

Switching Characteristics

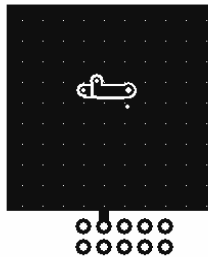
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15\text{V}, I_D = 14\text{A}, V_{GS} = 10\text{V}, R_{GEN} = 6\Omega$		9	18	ns
t_r	Rise Time			3	10	ns
$t_{d(off)}$	Turn-Off Delay Time			21	34	ns
t_f	Fall Time			2	10	ns
Q_g	Total Gate Charge		$V_{GS} = 0\text{V to } 10\text{V}$	$V_{DD} = 15\text{V}, I_D = 14\text{A}$	18	26
Q_g	Total Gate Charge	$V_{GS} = 0\text{V to } 5\text{V}$	10		14	nC
Q_{gs}	Gate to Source Charge		3.2			nC
Q_{gd}	Gate to Drain "Miller" Charge		2.7			nC

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 14\text{A}$ (Note 2)		0.8	1.2	V
t_{rr}	Reverse Recovery Time	$I_F = 14\text{A}, di/dt = 100\text{A}/\mu\text{s}$		27	44	ns
Q_{rr}	Reverse Recovery Charge			15	27	nC

NOTES:

- $R_{\theta JA}$ is determined with the device mounted on a 1in^2 pad 2 oz copper pad on a $1.5 \times 1.5\text{in.}$ board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. $50^\circ\text{C}/\text{W}$ when mounted on a 1in^2 pad of 2 oz copper.



b. $125^\circ\text{C}/\text{W}$ when mounted on a minimum pad of 2 oz copper.

- Pulse Test: Pulse Width < $300\mu\text{s}$, Duty cycle < 2.0%.
- Starting $T_J = 25^\circ\text{C}$, $L = 3\text{mH}$, $I_{AS} = 12\text{A}$, $V_{DD} = 30\text{V}$, $V_{GS} = 10\text{V}$.

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

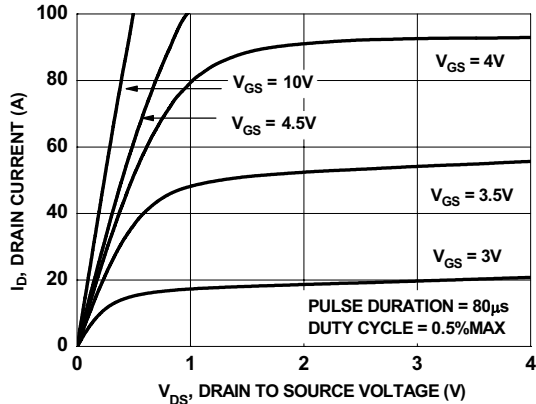


Figure 1. On-Region Characteristics

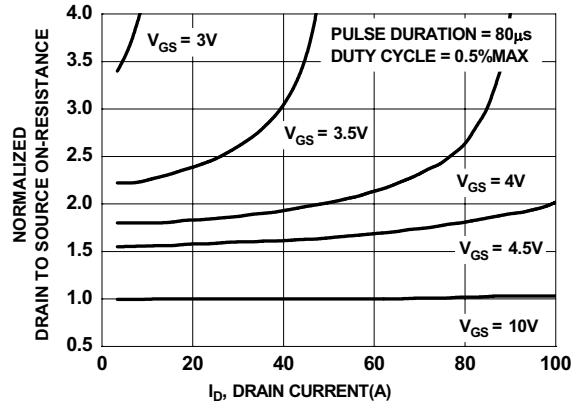


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

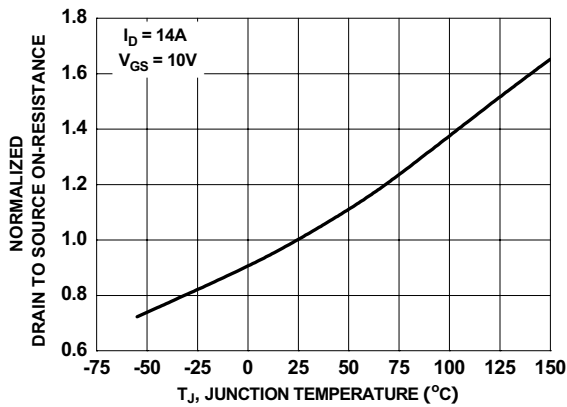


Figure 3. Normalized On-Resistance vs Junction Temperature

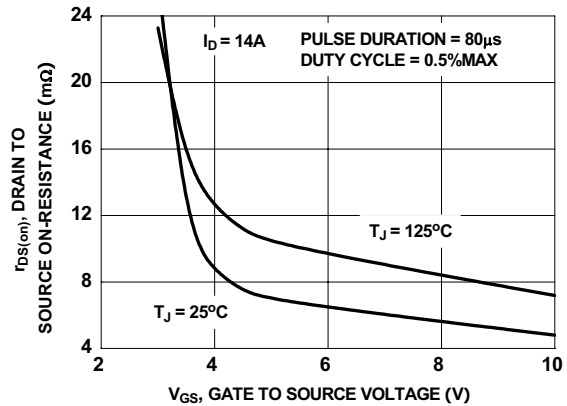


Figure 4. On-Resistance vs Gate to Source Voltage

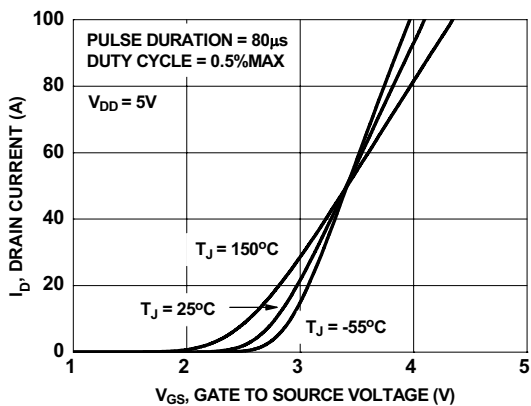


Figure 5. Transfer Characteristics

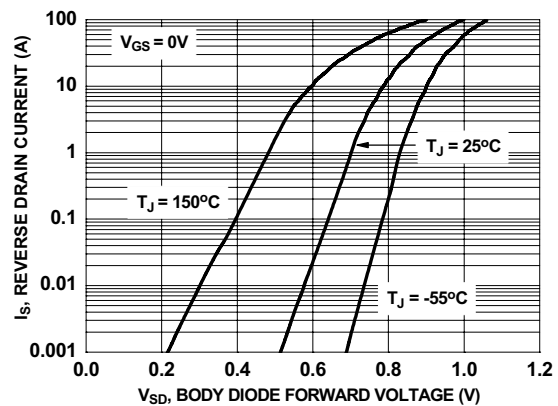


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

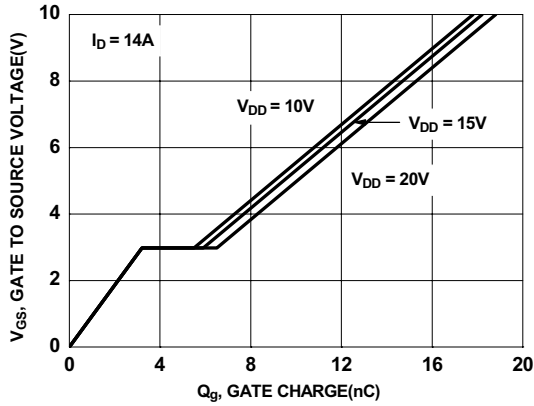


Figure 7. Gate Charge Characteristics

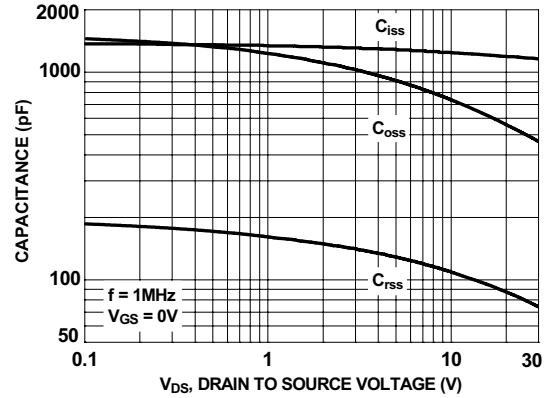


Figure 8. Capacitance vs Drain to Source Voltage

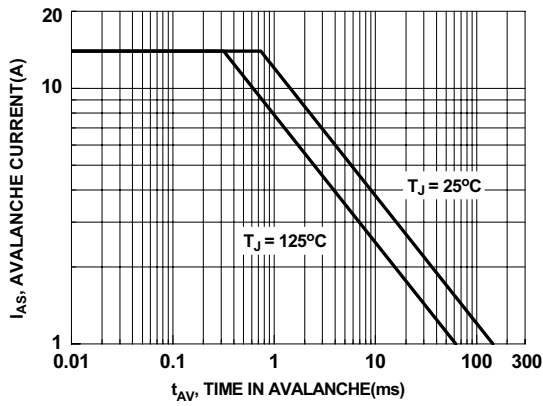


Figure 9. Unclamped Inductive Switching Capability

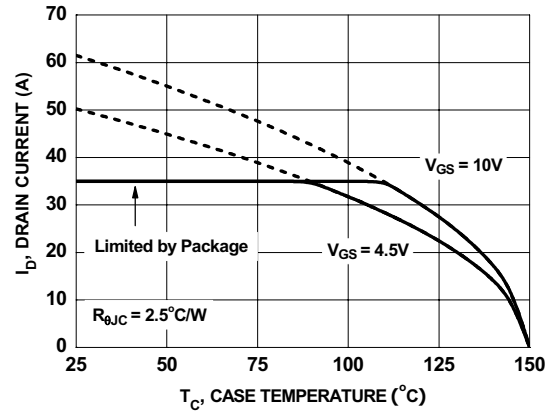


Figure 10. Maximum Continuous Drain Current vs Case Temperature

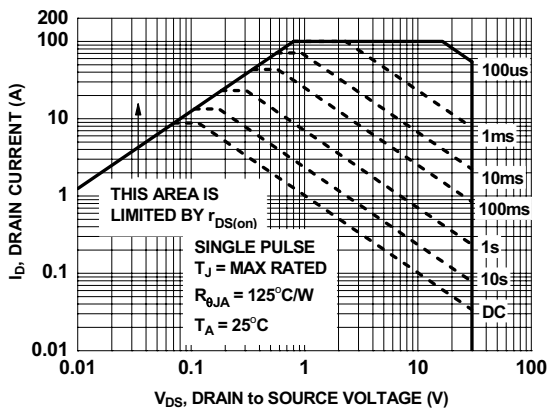


Figure 11. Forward Bias Safe Operating Area

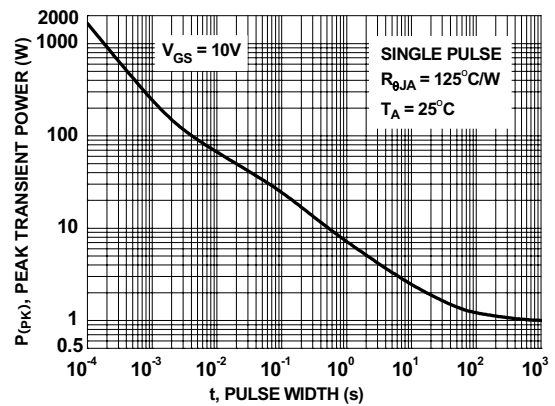


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

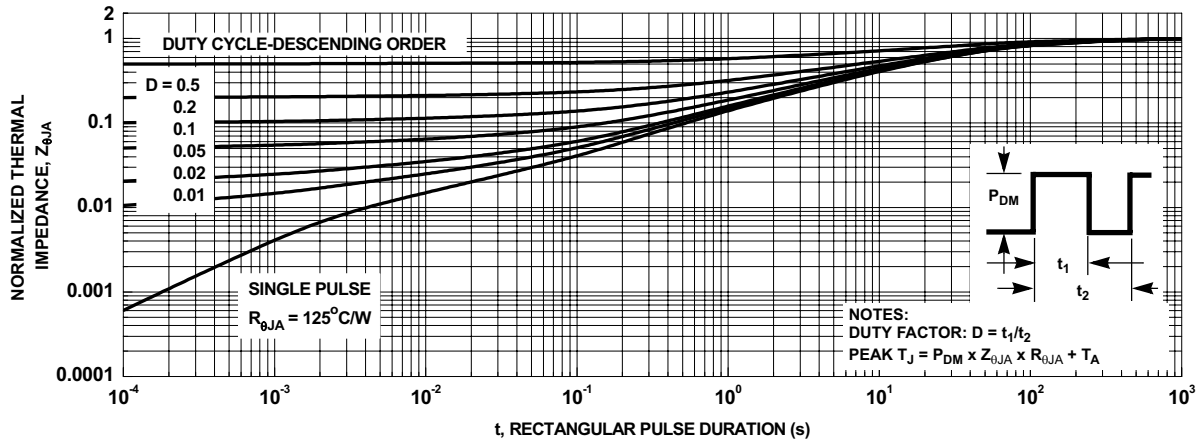
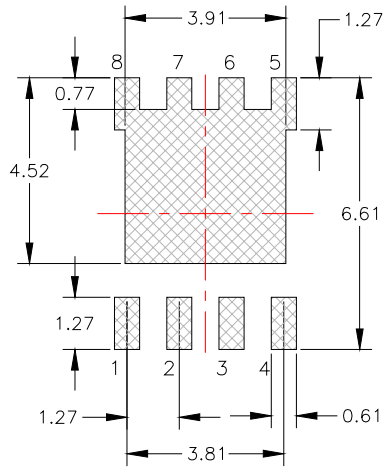
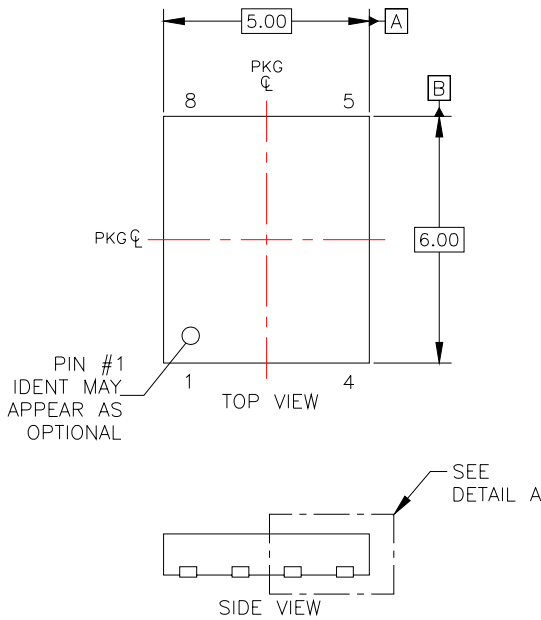
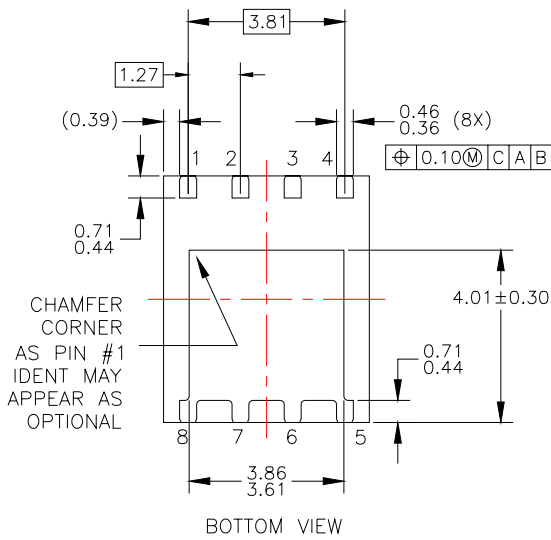


Figure 13. Transient Thermal Response Curve

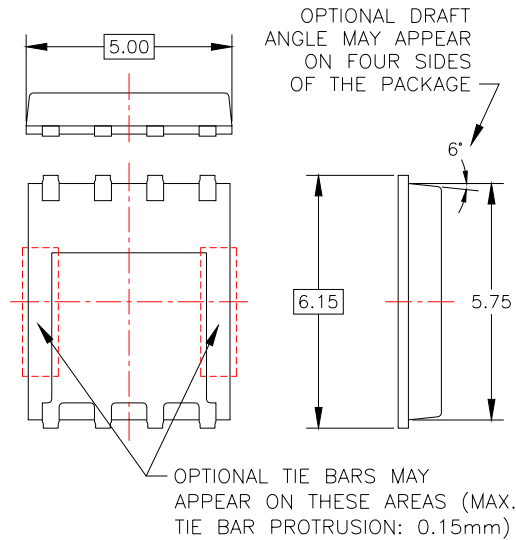
Dimensional Outline and Pad Layout



LAND PATTERN RECOMMENDATION

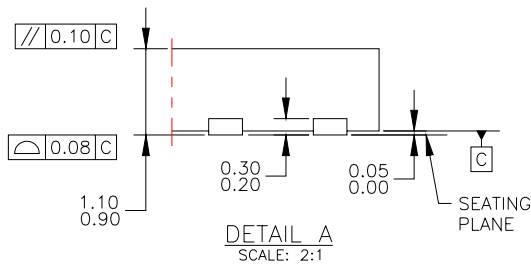


BOTTOM VIEW



OPTIONAL DRAFT ANGLE MAY APPEAR ON FOUR SIDES OF THE PACKAGE

OPTIONAL TIE BARS MAY APPEAR ON THESE AREAS (MAX. TIE BAR PROTRUSION: 0.15mm)



DETAIL A
SCALE: 2:1





NOTES: UNLESS OTHERWISE SPECIFIED

- A) PACKAGE STANDARD REFERENCE: JEDEC MO-240, ISSUE A, VAR. AA, DATED OCTOBER 2002.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
- E) DRAWING FILE NAME: PQFN08AREV4



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Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
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